P14-54

A biotechnological approach for the development of an enzyme-based platform with applications in the field of personalized medicine

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"Personalized medicine" is a new concept in healthcare, one aspect of which defines the specificity and dosage of drugs according to effectiveness and safety for each patient. Dosage strongly depends on the rate of metabolism which is primarily regulated by the activity of cytochrome P450. In addition to the need for a genetic characterization of the patients, there is also the necessity to determine the drug clearance properties of the polymorphic drug metabolising enzymes.It is well-recognized that patients administered a particular drug will exhibit significant inter-individual variability in their response to treatment. Unfortunately some patients will fail to respond to the therapy entirely, while some others will suffer dose-related side effects, resulting in significant costs and fatalities. For these reasons, polymorphism in genes encoding the drug metabolizing cytochromes P450 and flavin-containing monooxygenases is a very important factor that can no longer be neglected in the development of new drugs. Progress in the human genome analysis has recently made it possible to identify a patient's cytochromes P450 make up by genotype analysis using the AmpliChip CYP450 Test available from Roche Diagnostics. However, genotyping needs a parallel enzyme-based platform capable of rapidly measuring a drug's pharmacokinetics and clearance by the polymorphic drug metabolising enzymes typical of a given genotype, and to this date, such a platform is not available; this is the subject of the present work.